Fact Sheet

Public Comment Start Date: June 26, 2006
Public Comment Expiration Date: July 26, 2006

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Proposed Reissuance of a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge Pollutants Pursuant to the Provisions of the Clean Water Act (CWA)

Town of Harrah
Wastewater Treatment Plant

EPA Proposes To Reissue NPDES Permit

EPA proposes to reissue an NPDES permit to the facility referenced above. The draft permit places conditions on the discharge of pollutants from the wastewater treatment plant to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility.

This Fact Sheet includes:
- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions for the facility
- a map and description of the discharge location
- technical material supporting the conditions in the permit

Clean Water Act Section 401 Certification

The state in which the discharge originates is typically responsible for issuing the certification pursuant to CWA Section 401(a)(1). In cases where the state has no authority to give 401 certification, such as for a discharge located within the boundaries of an Indian Reservation, EPA provides the certification. The point of discharge of the outfall is also located within boundaries of the Confederated Tribes and Bands of the Yakama Nation. Indian Tribes may issue 401 certification for discharges within their boundaries if the Tribe has been approved by the EPA pursuant to CWA Section 518(e) and 40 CFR Section 131.8 to administer a water quality standards program. The Yakama Nation has not yet been authorized to provide 401 certification. Therefore, EPA is responsible for issuing the Section 401 certification in this case. However, EPA has consulted with the Yakama Nation in the course of issuing this NPDES permit.

Public Comment
Persons wishing to comment on, or request a Public Hearing for the draft permit for this facility may do so in writing by the expiration date of the Public Comment period. A request for a Public Hearing must state the nature of the issues to be raised as well as the requester's name, address and telephone number. All comments and requests for Public Hearings must be in writing and should be submitted to EPA as described in the Public Comments Section of the attached Public Notice.

After the Public Notice expires, and all comments have been considered, EPA's regional Director for the Office of Water will make a final decision regarding permit issuance. If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If comments are received, EPA will address the comments and issue the permit. The permit will become effective 30 days after the issuance date, unless an appeal is submitted to the Environmental Appeals Board within 30 days.

Documents are Available for Review
The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday at the address below. The draft permits, fact sheet, and other information can also be found by visiting the Region 10 NPDES website at "http://epa.gov/r10earth/waterpermits.htm."

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue, OW-130
Seattle, Washington 98101
(206) 553-6251 or
Toll Free 1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The fact sheet and draft permits are also available at:

EPA Washington Operations Office
300 Desmond Dr. SE, Suite 102
Lacey, WA 98503
(360) 753-9457

Harrah Public Library
21 East Pioneer
Harrah, WA 98933
(509) 848-3458

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Acronyms

1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
AML	Average Monthly Limit
ASR	Alternative State Requirements (see 40 CFR 133.105(d))
BOD_5	Biochemical oxygen demand, five-day
°C	Degrees Celsius
CFR	Code of Federal Regulations
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
lbs/day	Pounds per day
LTA	Long Term Average
mg/L	Milligrams per liter
ml	milliliters
ML	Minimum Level
µg/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit
N	Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OW	Office of Water
O&M	Operations and maintenance
POTW	Publicly owned treatment works
QAP	Quality assurance plan
RP	Reasonable Potential
RPM	Reasonable Potential Multiplier

RWC	Receiving Water Concentration
s.u.	Standard Units
TMDL	Total Maximum Daily Load
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001)
TSS	Total suspended solids
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WAC	Washington Administrative Code
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit
WWTP	Wastewater treatment plant

I. Applicant

This fact sheet provides information on the draft NPDES permit for the following entity:

Town of Harrah
NPDES Permit # WA-002270-5

Physical Address:
8761 Branch Road
Harrah, WA 98933

Mailing Address:
P.O. Box 10
Harrah, WA 98933

Contact: Garry Decker, Director of Public Works

II. Facility Information

The Town of Harrah owns, operates, and maintains a wastewater treatment plant (WWTP) located in Harrah, Washington which is in Yakima County and within the boundaries of the Yakama Reservation. The wastewater treatment plant treats domestic sewage.

Details about the wastewater treatment processes and waste streams are included in Appendix A. See Appendix B for a map of the location of the treatment plant and discharge.

The previous NPDES permit for the facility expired on June 30, 1987. The permittee submitted a timely and complete application for renewal of its NPDES permit, which EPA received on June 1, 1987. The previous permit has been “administratively extended” under 40 CFR 122.6 and remains fully effective and enforceable until the permit can be reissued. The Town also responded to an EPA questionnaire about the discharge in 1998.

III. Receiving Water

The Town of Harrah WWTP discharges to the Harrah Drain.

A. Low Flow Conditions

According to Garry Decker, Public Works Director for the Town of Harrah, the Harrah Drain is generally dry upstream of the discharge during the non-irrigation season. Limited flow data for the Harrah Drain are available from the United States Geological Survey (USGS). Flow and water quality data were collected at monitoring station #12505466 (Harrah Drain at Harrah Drain Road) between July, 1987 and October, 1989. These data indicate that the Harrah Drain flows between March and November. EPA will assume that the upstream flow rate from December through February is zero.

There were a total of four flow measurements taken at the USGS station, ranging between 3 and 21 cubic feet per second (CFS) and averaging 8.1 CFS. Based on the recommendations of the *Technical Support Document for Water Quality-based Toxics Control* (EPA, 1991) EPA generally uses the lowest 1-day and 7-day average flow rates expected to occur once every ten years in the receiving water (the 1Q10 and 7Q10 flow rates), to determine whether water quality-based effluent limits are necessary to protect aquatic life uses of the receiving water and to calculate those effluent limits, when permitting discharges to flowing waters. Because there are not enough flow data to calculate the 1Q10 and 7Q10, EPA has used the minimum known receiving water flow rate of 3 CFS in lieu of the 1Q10 and 7Q10 during the irrigation season (March through November).

B. Water Quality Standards

Section 301(b)(1)(C) of the Clean Water Act requires that NPDES permits contain effluent limits necessary to meet water quality standards. A State or Tribe's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria, and an anti-degradation policy. The use classification system designates the beneficial uses (such as cold water biota, contact recreation, etc.) that each water body is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the State or Tribe to support the beneficial use classification of each water body. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses.

At the point of discharge, the Harrah Drain is considered waters of the Confederated Tribes and Bands of the Yakama Nation (Yakama). The Yakama Nation is in the process of obtaining EPA approval for the water quality standards that it has adopted. However, at this time, there are no EPA-approved water quality standards for the Yakama Nation.

In situations where facilities are discharging into Tribal waters, and the Indian Nation does not have EPA-approved water quality standards, it has been EPA's practice to apply adjacent or downstream standards to the water body for the purpose of developing permit limitations and conditions. The federal regulation 40 CFR 122.4(d) gives EPA the authority to protect the waters of all affected States. In this permit, EPA has used the *Water Quality Standards for Surface Waters of the State of Washington* (Chapter 173-201A, Washington Administrative Code) in developing effluent limits for discharge to the Harrah Drain.

The Harrah Drain is not specifically classified in WAC 173-201A-030. The Washington Water Quality Standards state, in WAC 173-201A-020, that all unclassified fresh waters are "Class A." Characteristic uses of Class A waterbodies include, but are not limited to:

- domestic, industrial and agricultural water supply;
- stock watering;
- migration, rearing, spawning and harvesting of salmonids and other fish;
- wildlife habitat;
- recreation including primary contact recreation, sport fishing, boating, and aesthetic enjoyment; and
- commerce and navigation

If they were in effect for Clean Water Act purposes, the Yakama Nation's water quality standards would protect the Harrah Drain for cultural and religious uses in addition to the uses listed above.

Some of the water quality criteria that the State of Washington has deemed necessary to protect these uses are as follows:

Table 1: Water Quality Criteria for "Class A" Fresh Waters	
pH	Within the range of 6.5 to 8.5 standard units with a human-caused variation within the above range of less than 0.5 standard units.
Fecal Coliform Bacteria	Fecal coliform organism levels shall both not exceed a geometric mean value of 100 colonies/100 mL, and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 200 colonies/100 mL.
Chlorine	11 µg/L chronic, 19 µg/L acute
Aesthetics	Aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste.

IV. Effluent Limitations

A. Basis for Effluent Limitations

In general, the CWA requires that the effluent limits for a particular pollutant be the more stringent of either technology-based limits or water quality-based limits. Technology-based limits are set according to the level of treatment that is achievable using available technology. A water quality-based effluent limit is designed to ensure that the water quality standards of a waterbody are being met and may be more stringent than technology-based effluent limits. The bases for the proposed effluent limits in the draft permit are provided in Appendix C.

B. Proposed Effluent Limitations

Below are the proposed effluent limits that are in the draft permit.

1. Removal Requirements for BOD_5 and TSS: The monthly average effluent concentration must not exceed 35 percent of the monthly average influent concentration. Percent removal of BOD_5 must be reported on the Discharge Monitoring Reports (DMRs). The monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month. Influent and effluent samples must be taken over approximately the same time period.
2. The permittee must not discharge materials which offend the senses of sight, smell, touch or taste.

Table 2 (below) presents the proposed average monthly, average weekly, and maximum daily effluent limits.

Table 2: Proposed Effluent Limits				
Parameter	**Units**	**Effluent Limits**		
		Average Monthly Limit	**Average Weekly Limit**	**Maximum Daily Limit**
Flow	mgd	0.055	0.0825	—
Five-Day Biochemical Oxygen Demand (BOD_5)	mg/L	39	59	—
	lb/day	18	27	—
	% removal	65% (min.)	—	—
Total Suspended Solids (TSS)	mg/L	56	84	—
	lb/day	26	39	
	% removal	65% (min.)	—	—
pH March – November	s.u.	6.0 to 8.5 at all times		
pH December – February	s.u.	6.5 to 8.5 at all times		
Fecal Coliform Bacteria March – November	#/100 ml	200 (geometric mean)	400 (geometric mean)	—
Fecal Coliform Bacteria December - February	#/100 ml	100 (geometric mean)	—	200
Total Residual Chlorine[1,2] Final	µg/L	8	—	18
	gram/day	1.7	—	3.7
Total Residual Chlorine[1,2] Interim	µg/L	500	750	—
	lb/day	0.23	0.34	—

Notes:
1. The final effluent limits for total residual chlorine are not quantifiable using EPA-approved methods. EPA will use the minimum level (ML), 100 µg/L, as the compliance evaluation level for this parameter. The permittee will be compliant with the total residual chlorine limitations if the average monthly and maximum daily chlorine concentrations are less than 100 µg/L and the average monthly and maximum daily mass discharges of chlorine are less than 20.8 grams/day.
2. The final effluent limits for total residual chlorine will become effective three years after the effective date of the final permit. Until that time, the interim limits apply.

C. Basis for Less Stringent Effluent Limits

The effluent limitations for 5-day biochemical oxygen demand (BOD_5) are less stringent than those in the previous permit. All other effluent limitations are as stringent as or more stringent than those in the previous permit.

Statutory Prohibitions on Backsliding

Section 402(o)(1) of the CWA states that a permit may not be reissued with less-stringent limits established based on Sections 301(b)(1)(C), 303(d) or 303(e) (i.e. water quality-based limits or limits established in accordance with State treatment standards) except in compliance with Section 303(d)(4). Section 402(o)(1) also prohibits backsliding on technology-based effluent limits established using best professional judgment (i.e. based on Section 402(a)(1)(B)). In this case, the effluent limits being revised are technology-based effluent limits, but were based on Sections 301(b)(1)(B) and 304(d)(1) of the Act and are therefore exempt from the statutory prohibition on backsliding in Section 402(o)(1).

Basis for Less Stringent Effluent Limits for BOD$_5$

The effluent limitations for five-day biochemical oxygen demand in the previous permit were based on the "secondary treatment" effluent limits promulgated in 40 CFR 133.102. However, 40 CFR 133.105 allows these limits to be relaxed under the following conditions:

- The BOD$_5$ and TSS concentrations consistently achievable through proper operation and maintenance must be higher than the "secondary treatment" effluent limits,
- A trickling filter or waste stabilization pond (lagoon) must be used as the principal treatment process, and
- The treatment works must provide significant biological treatment of municipal wastewater, meaning that the treatment works can consistently achieve 65 percent removal of BOD$_5$.

Recent effluent data show that the Harrah WWTP meets all three of these criteria, therefore the BOD$_5$ effluent limits have been relaxed. See Appendix C for a detailed discussion to the technology-based BOD$_5$ effluent limits applicable to this discharge.

D. Schedule of Compliance

Discharge permits for point sources may incorporate schedules of compliance, which allow a discharger to phase in, over time, compliance with water quality-based effluent limitations when new limitations are in the permit for the first time. Schedules of compliance are authorized by 40 CFR 122.47. The draft permit proposes a 3-year compliance schedule for the water quality-based chlorine limits. In the interim, the permittee must comply with technology-based effluent limits for chlorine.

V. Monitoring Requirements

A. Basis for Effluent and Surface Water Monitoring

Section 308 of the CWA and federal regulation 40 CFR 122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limitations are required and/or to monitor effluent impacts on receiving water quality. The permittee is responsible for conducting the monitoring and for reporting results on Discharge Monitoring Reports (DMRs) or on the application for renewal, as appropriate, to the U.S. Environmental Protection Agency (EPA).

B. Effluent Monitoring

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Permittees have the option of taking more frequent samples than are required under the permit. These samples can be used for averaging if they are conducted using EPA approved test methods (generally found in 40 CFR 136) and if the Minimum Levels (MLs) are less than the effluent limits.

Table 3, below, presents the effluent monitoring requirements for the Town of Harrah in the draft permit. The sampling location must be after the last treatment unit and prior to discharge to the receiving water. If no discharge occurs during the reporting period, "no discharge" shall be reported on the DMR.

Monitoring Changes from Previous Permit

Wastewater treatment plant discharges often have the reasonable potential to cause or contribute to water quality standards violations for ammonia. Therefore, the draft permit proposes effluent monitoring for total ammonia as N. The draft permit also proposes effluent monitoring for alkalinity and receiving water monitoring for ammonia, pH, temperature and alkalinity. When the permit is reissued, EPA will use these data to determine if the discharge has the reasonable potential to cause or contribute to water quality standards violations for ammonia. If the data show that the discharge has the reasonable potential to cause or contribute to water quality standards violations for ammonia, the reissued permit will contain water quality-based effluent limits for ammonia. The data will also be used to re-evaluate the pH effluent limits. James Thomas of the Yakama Nation Environmental Protection Program had expressed concerns about the effects of phosphorus discharges from the facility. Therefore, the draft permit proposes effluent and receiving water monitoring for total phosphorus and orthophosphate in order to characterize the facility's discharge of phosphorus and its effect on the receiving water. All other monitoring requirements have been carried over from the previous permit.

Table 3: Effluent Monitoring Requirements

Parameter	Unit	Sample Location	Sample Frequency	Sample Type
Flow	mgd	Effluent	Daily	measure
BOD_5	mg/L	Influent and Effluent	2/month	8-hour composite
	lbs/day		2/month	calculation[1]
	% Removal	% Removal	1/month	calculation[2]
TSS	mg/L	Influent and Effluent	2/month	8-hour composite
	lbs/day		2/month	calculation[1]
	% Removal	% Removal	1/month	calculation[2]
Total Residual Chlorine	mg/L	Effluent	2/week	grab
	lb/day			calculation
pH	standard units	Effluent	2/week	grab
Temperature	ºC	Effluent	2/week	grab
Fecal Coliform Bacteria	#/100 ml	Effluent	2/month	grab
Dissolved Oxygen	mg/L	Effluent	2/week	grab
Total Ammonia as N	mg/L	Effluent	1/quarter	8-hour composite
Alkalinity	mg/L	Effluent	1/quarter	8-hour composite
Total Phosphorus as P[3]	mg/L	Effluent	Annual	8-hour composite
Orthophosphate as P[3]	mg/L	Effluent	Annual	8-hour composite

Table 3: Effluent Monitoring Requirements				
Parameter	**Unit**	**Sample Location**	**Sample Frequency**	**Sample Type**
Notes: 1. Loading is calculated by multiplying the concentration in mg/L by the average daily flow in mgd and a conversion factor of 8.34. 2. Percent removal is calculated using the following equation: (average monthly influent – average monthly effluent) ÷ average monthly influent. 3. Effluent sampling for orthophosphate as P must coincide with effluent sampling for total phosphorus as P.				

C. Surface Water Monitoring

Table 4 presents the proposed surface water monitoring requirements for the draft permit. Surface water monitoring results must be submitted with the application for renewal of this NPDES permit.

Table 4: Surface Water Monitoring Requirements			
Parameter (units)	**Sample Locations**	**Sample Frequency**[1]	**Sample Type**
Flow (CFS)	Upstream	2/year	Measure
Total Ammonia as N (mg/L)	Upstream and Downstream	2/year	Grab
pH (s.u)	Upstream and Downstream	2/year	Grab
Temperature (ºC)	Upstream and Downstream	2/year	Grab
Alkalinity	Upstream and Downstream	2/year	Grab
Total Phosphorus as P	Upstream and Downstream	Annual	Grab
Orthophosphate as P	Upstream and Downstream	Annual	Grab
Notes: 1. Receiving water samples must be taken when the Harrah Drain flows upstream of the discharge and must coincide with effluent sampling .			

VI. Sludge (Biosolids) Requirements

EPA Region 10 separates wastewater and sludge permitting. Under the CWA, EPA has the authority to issue separate sludge-only permits for the purposes of regulating biosolids. EPA may issue a sludge-only permit to each facility at a later date, as appropriate.

Until future issuance of a sludge-only permit, sludge management and disposal activities at each facility continue to be subject to the national sewage sludge standards at 40 CFR Part 503 and any requirements of the State or Tribe's biosolids program. The Part 503 regulations are self-implementing, which means that facilities must comply with them whether or not a permit has been issued.

VII. Other Permit Conditions

A. Quality Assurance Plan

The federal regulation at 40 CFR 122.41(e) requires the permittee to develop procedures to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. The Town of Harrah is required to develop and implement a Quality Assurance Plan within 180 days of the effective date of the final permit. The Quality

Assurance Plan shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting. The plan shall be retained on site and made available to EPA and the Yakama Nation Environmental Protection Program upon request.

B. Operation and Maintenance Plan

The permit requires the Town of Harrah to properly operate and maintain all facilities and systems of treatment and control. Proper operation and maintenance is essential to meeting discharge limits, monitoring requirements, and all other permit requirements at all times. The Town of Harrah is required to develop and implement an operation and maintenance plan for their facility within 180 days of the effective date of the final permit. The plan shall be retained on site and made available to EPA and the Yakama Nation Environmental Protection Program upon request.

C. Additional Permit Provisions

Sections III, IV and V of the draft permit contain standard regulatory language that must be included in all NPDES permits. Because they are regulations, they cannot be challenged in the context of an NPDES permit action. The standard regulatory language covers requirements such as monitoring, recording, and reporting requirements, compliance responsibilities, and other general requirements.

VIII. Other Legal Requirements

A. Endangered Species Act

The Endangered Species Act requires federal agencies to consult with National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species. EPA has determined that the discharge from the Town of Harrah WWTP will not affect any threatened or endangered species in the vicinity of the discharge, therefore consultation is not required for this action.

B. Essential Fish Habitat

Essential fish habitat (EFH) is the waters and substrate (sediments, etc.) necessary for fish to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires EPA to consult with NOAA Fisheries when a proposed discharge has the potential to adversely affect (reduce quality and/or quantity of) EFH. EPA has determined that the discharge from the Town of Harrah WWTP will not affect any EFH species in the vicinity of the discharge, therefore consultation is not required for this action.

C. State/Tribal Certification

The Yakama Nation has not yet been authorized to provide 401 certification. Therefore, EPA is responsible for issuing the Section 401 certification in this case. However, EPA has consulted with the Yakama Nation in the course of issuing this NPDES permit.

D. Interstate Waters

Under 40 CFR 124.10(c)(1)(iii), EPA must give notice of this permit action to any affected State. Notice has been given to Washington Department of Ecology. A copy of the proposed permit action has also been provided to the Yakama Nation and the Bureau of Indian Affairs.

E. Permit Expiration

The permit will expire five years from the effective date.

IX. References

EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control.* US Environmental Protection Agency, Office of Water, EPA/505/2-90-001.

Water Pollution Control Federation. Subcommittee on Chlorination of Wastewater. *Chlorination of Wastewater.* Water Pollution Control Federation. Washington, D.C. 1976.

Appendix A: Facility Information

General Information

NPDES ID Number:	WA-002270-5
Physical Address:	8761 Branch Road Harrah, WA 98933
Mailing Address:	P.O. Box 10 Harrah, WA 98933

Facility Information

Type of Facility:	Publicly Owned Treatment Works (POTW)
Treatment Train:	Preliminary Treatment • Bar Screen • Dewatering and landfilling removed solids Primary Treatment and Secondary Treatment • 3-Cell Aerated Lagoon • Chlorine contact chamber
Sludge (biosolids) Handling:	Land Application every 7 to 10 years.
Flow:	Monthly average design flow is 0.055 mgd. Maximum daily design flow is 0.090 mgd. Average actual flow from 2000-2006 was 0.041 mgd, with a maximum actual flow of 0.066 mgd.
Outfall Location:	Outfall 001: latitude 46° 24' 50" N; longitude 119° 49' 30" W

Receiving Water Information

Receiving Water:	Harrah Drain
Watershed:	Lower Yakima (17030003)
Receiving Water Classification for Water Quality Standards	Class A (Washington)

Appendix B: Facility Map and Aerial Photo

Map source: Google Maps. © 2006 Google. Imagery © 2006 DigitalGlobe. Map Data © 2006 NAVTEQ.

Appendix C: Basis for Effluent Limits

The following discussion explains in more detail the statutory and regulatory basis for the technology and water quality-based effluent limits in the draft permit. Part A discusses technology-based effluent limits, Part B discusses water quality-based effluent limits in general, and Part C discusses facility specific water quality-based effluent limits.

A. Technology-Based Effluent Limits

Federal Secondary Treatment Effluent Limits

In sections 301(b)(1)(B) and 304(d)(1), the Act established a performance level, referred to as "secondary treatment," which all POTWs were required to meet by July 1, 1977. EPA developed and promulgated "secondary treatment" regulations that are found in 40 CFR 133. These technology-based effluent limits apply to all municipal wastewater treatment plants, and identify the minimum level of effluent quality attainable by secondary treatment in terms of BOD_5 TSS, and pH. The federally promulgated secondary treatment effluent limits are listed in Table C-1.

Table C-1: Secondary Treatment Effluent Limits
(40 CFR 133.102)

Parameter	Average Monthly Limit	Average Weekly Limit	Range
BOD_5 and TSS	30 mg/L	45 mg/L	---
Removal Rates for BOD_5 and TSS	85% (minimum)	---	---
pH	---	---	6.0 - 9.0 s.u.

Treatment Equivalent to Secondary

Some POTWs which use waste stabilization ponds (lagoons) or trickling filters may have difficulty complying with the secondary treatment effluent limits in Table C-1. To address this, EPA has established a level of effluent quality called "treatment equivalent to secondary." Effluent limits for facilities eligible for "treatment equivalent to secondary" generally may not be less stringent than those listed in Table C-2.

Table C-2: Treatment Equivalent to Secondary Effluent Limits
(40 CFR 133.105(a)-(c))

Parameter	Average Monthly Limit	Average Weekly Limit	Range
BOD_5 and TSS	45 mg/L	65 mg/L	---
Removal Rates for BOD_5 and TSS	65% (minimum)	---	---
pH	---	---	6.0 - 9.0 s.u.

In order to be eligible for "treatment equivalent to secondary" effluent limits, the POTW must meet the following requirements in 40 CFR 133.101(g):

- The BOD_5 and TSS concentrations consistently achievable through proper operation and maintenance must be higher than the "secondary treatment" effluent limits,
- A trickling filter or waste stabilization pond (lagoon) must be used as the principal treatment process, and

- The treatment works must provide significant biological treatment of municipal wastewater, meaning that the treatment works can consistently achieve 65 percent removal of BOD_5.

The Harrah WWTP uses waste stabilization ponds as the principal treatment process. EPA has reviewed the effluent data for the Harrah facility and determined that the facility is eligible for “treatment equivalent to secondary” effluent limits for both BOD_5 and TSS because the facility can consistently achieve greater than 65% removal of BOD_5, however, the “effluent concentrations consistently achievable through proper operation and maintenance” of the treatment plant, as defined in 40 CFR 133.101(f), are higher than the “secondary treatment” effluent limits.

Alternative State Requirements

Alternative State Requirements are authorized by 40 CFR 133.105(d) and allow for less stringent limits than the “treatment equivalent to secondary” effluent limits for facilities eligible for “treatment equivalent to secondary” within a certain geographical area. The ASR for the State of Washington is an average monthly TSS limit of 75 mg/L (49 FR 37005, September 20th, 1984). The previous permit used Washington’s “alternative State requirements” (ASR) effluent limits for TSS (an average monthly limit of 75 mg/L).

Special Considerations for Waste Stabilization Ponds

An alternate basis for establishing TSS effluent limits for POTWs using waste stabilization ponds that are less stringent than “treatment equivalent to secondary” limits is 40 CFR 133.103(c). This regulation allows TSS limits to be set equal to the TSS effluent concentration achieved 90 percent of the time by waste stabilization ponds within a State or appropriate contiguous geographical area.

Limitations on Permit Adjustments for Treatment Equivalent to Secondary and Alternative State Requirements

The federal regulation 40 CFR 133.105(f)(1) requires that permitting authorities include effluent limits for existing POTWs that are more stringent than “treatment equivalent to secondary” effluent limits or ASRs, if the permitting authority demonstrates, based on an analysis of the past performance of the treatment works, that the treatment works can achieve more stringent effluent limits.

EPA has determined that the facility can consistently (i.e. with 95% confidence) comply with effluent limits more stringent than the “treatment equivalent to secondary” limits for BOD_5 concentration. EPA has determined that the facility can consistently comply with a monthly average effluent limit of 39 mg/L BOD_5. Based on 40 CFR 133.101(f), the average weekly limit is calculated to be 1.5 times the average monthly limit, or 59 mg/L.

EPA has determined that, for this facility, TSS effluent limits calculated on the basis of 40 CFR 133.103(c) (special considerations for waste stabilization ponds) would be more stringent than the “alternative state requirements” TSS effluent limits. For the purposes of permitting this facility, EPA will define the “contiguous geographical area” in 40 CFR 133.103(c) as the Yakama Reservation. The Town of Harrah WWTP is the only EPA-permitted POTW using waste stabilization ponds within the boundaries of the Yakama Reservation. Consistent with the requirement of 40 CFR 133.103(c) that TSS effluent limits for waste stabilization ponds be set equal to the effluent concentration achieved 90 percent of the time by waste stabilization pond POTWs within an appropriate contiguous geographical area, EPA has set the average monthly TSS limit equal to the 90^{th} percentile TSS concentration observed at the facility between January 2000 and March 2006, which is 56 mg/L. The average weekly limit is calculated to be 1.5 times the average monthly limit, or 84 mg/L.

EPA has included monthly average percent removal limits for BOD_5 and TSS equal to the 65% minimum "treatment equivalent to secondary" requirements of 40 CFR 133.105. The previous permit did not contain percent removal limits for TSS, but effluent data show that the facility can consistently comply with the 65% removal requirement from the "treatment equivalent to secondary" rule for both BOD_5 and TSS.

Therefore, the draft permit proposes the BOD and TSS effluent limits in Table C-3:

Table C-3: Town of Harrah Technology-based Effluent Limits for BOD_5 and TSS

Parameter	Average Monthly Limit	Average Weekly Limit
BOD_5 Concentration	39	59
BOD_5 Percent Removal	65% (minimum)	---
TSS Concentration	56	84
TSS Percent Removal	65% (minimum)	---

Chlorine

The Harrah Wastewater Treatment Plant uses chlorine to disinfect its wastewater. A 0.5 mg/L average monthly limit for chlorine is derived from standard operating practices. The Water Pollution Control Federation's *Chlorination of Wastewater* (1976) states that a properly designed and maintained wastewater treatment plant can achieve adequate disinfection if a 0.5 mg/L chlorine residual is maintained after 15 minutes of contact time. Therefore, a wastewater treatment plant that provides adequate chlorine contact time can meet a 0.5 mg/L total residual chlorine limit on a monthly average basis. In addition to average monthly limits (AMLs), NPDES regulations require effluent limits for POTWs to be expressed as average weekly limits (AWLs) unless impracticable. The AWL is calculated to be 1.5 times the AML, consistent with the "secondary treatment" limits for BOD_5 and TSS. This results in an AWL for chlorine of 0.75 mg/L.

EPA has determined that the technology-based chlorine effluent limits are not sufficiently stringent to meet water quality standards in the Harrah Drain. Therefore, EPA has established more stringent water quality-based effluent limits for chlorine. The draft permit proposes a compliance schedule for the water quality-based chlorine limits. Until the final water quality-based effluent limits become effective, the permittee must comply with the technology-based chlorine limits.

Mass-Based Limits

The federal regulation at 40 CFR 122.45(f) requires that effluent limits be expressed in terms of mass, if possible. The regulation at 40 CFR 122.45(b) requires that effluent limitations for POTWs be calculated based on the design flow of the facility. The mass based limits are expressed in pounds per day and are calculated as follows:

Mass based limit (lb/day) = concentration limit (mg/L) × design flow (mgd) × 8.34[1]

The mass water quality-based limits for chlorine are expressed in grams per day instead of pounds per day, because the mass limit for chlorine is very small, making pounds per day an inconvenient unit to express the mass limit. The conversion factor from pounds to grams is 454 grams per pound.

B. Water Quality-based Effluent Limits

Statutory and Regulatory Basis

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards by July 1, 1977. Discharges to State or Tribal waters must also comply with limitations imposed by the State or Tribe as part of its certification of NPDES permits under section 401 of the CWA. Federal regulations at 40 CFR 122.4(d) prohibit the issuance of an NPDES permit that does not ensure compliance with the water quality standards of all affected States. The NPDES regulation (40 CFR 122.44(d)(1)) implementing Section 301(b)(1)(C) of the CWA requires that permits include limits for all pollutants or parameters which are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State or Tribal water quality standard, including narrative criteria for water quality.

The regulations require the permitting authority to make this evaluation using procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving water. The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation.

Because the Yakama Nation's water quality standards have not been approved by EPA, they are not in effect for Clean Water Act purposes, including NPDES permits. Therefore, based on 40 CFR 122.4(d), EPA has applied the State of Washington's water quality standards to the receiving water for the purposes of developing water quality-based effluent limits for this discharge.

Reasonable Potential Analysis

When evaluating the effluent to determine if water quality-based effluent limits are needed based on numeric criteria, EPA projects the receiving water concentration (downstream of where the effluent enters the receiving water) for each pollutant of concern. EPA uses the concentration of the pollutant in the effluent and receiving water and, if appropriate, the dilution available from the receiving water, to project the receiving water concentration. If the projected concentration of the pollutant in the receiving water exceeds the numeric criterion for that specific chemical, then the discharge has the reasonable potential to cause or contribute to an exceedance of the applicable water quality standard, and a water quality-based effluent limit is required.

Sometimes it is appropriate to allow a small area of the receiving water to provide dilution of the effluent. These areas are called mixing zones. Mixing zone allowances will increase the mass loadings of the pollutant to the water body, and decrease treatment requirements. Mixing zones

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[1] 8.34 is a conversion factor with units (lb × L)/(mg × gallon×10^6)

can be used only when there is adequate receiving water flow volume and the receiving water meets the criteria necessary to protect the designated uses of the water body.

Procedure for Deriving Water Quality-based Effluent Limits

The first step in developing a water quality-based effluent limit is to develop a wasteload allocation (WLA) for the pollutant. A wasteload allocation is the concentration or loading of a pollutant that the permittee may discharge without causing or contributing to an exceedance of water quality standards in the receiving water.

In cases where a mixing zone is not authorized, the criterion becomes the WLA. Establishing the criterion as the wasteload allocation ensures that the permittee will not cause or contribute to an exceedance of the criterion. The water quality-based effluent limits in this permit have been calculated using a mixing zone when there is flow in the receiving water upstream of the discharge. The following discussion details the specific water quality-based effluent limits in the draft permit.

Once a WLA is developed, EPA calculates effluent limits that are protective of the WLA using statistical procedures described in Appendix F.

C. Facility-Specific Water Quality-based Effluent Limits

pH

The water quality criteria state that the pH must be no less than 6.5 and no greater than 8.5 standard units, with a human-caused variation within the above range of no more than 0.5 standard units.

The permittee has collected pH data for the effluent. For the purposes of calculating pH limits, EPA used a literature value of 120 mg/L as $CaCO_3$ for the effluent alkalinity. EPA obtained pH and alkalinity data for the receiving water from the USGS monitoring station at Harrah Drain Road. EPA has used these data to determine the discharge's effects on the pH of the receiving water. EPA believes that a mixing zone for pH is appropriate during the irrigation season. The proposed pH limits are 6.0 to 8.5 standard units during the irrigation season and 6.5 to 8.5 standard units during the non-irrigation season. The ambient pH data show that the ambient pH is greater than 8.5 standard units at times, therefore, the receiving water cannot provide dilution of discharges with a pH greater than 8.5, so the discharge must comply with the upper bound of the pH criteria (a maximum of 8.5 standard units) at the end-of-pipe at all times. During the non-irrigation season (December – February), the receiving water does not flow upstream of the discharge and therefore cannot provide dilution of the effluent. Therefore, the pH criteria must comply with both the upper and lower bounds of the pH criteria prior to discharge from December through February.

Effluent data provided by the facility (a total of 239 data points) show a 1^{st} percentile effluent pH of 7.08 and a 99^{th} percentile effluent pH of 8.46. Therefore, EPA does not anticipate that the treatment plant will have difficulty complying with the more-stringent pH effluent limits and has not proposed a schedule of compliance for the more-stringent pH effluent limits. See Appendix E for effluent limit calculations for pH (during the irrigation season).

Total Residual Chlorine

EPA has determined that the technology-based effluent limits for chlorine are not stringent enough to prevent the discharge from causing or contributing to water quality standards violations. Therefore, EPA has calculated more stringent water quality-based effluent limits for chlorine. Effluent data show that the facility will not be able to comply with the water quality-based chlorine limits immediately. Therefore the draft permit proposes a 3-year compliance schedule for the chlorine effluent limits. In the interim, the permittee must comply with the tehnology-based effluent limits for total residual chlorine.

Fecal Coliform

EPA has determined that a discharge in compliance with the fecal coliform effluent limits in the previous permit will not cause or contribute to water quality standards violations during the irrigation season (March through November). Therefore, the fecal coliform effluent limits have been retained under the anti-backsliding provisions of Section 402(o) of the Act between March and November.

During the non-irrigation season, when there is no flow upstream of the discharge, the effluent limits in the previous permit are not stringent enough to prevent water quality standards violations for fecal coliform. The draft permit requires that the discharge meet Washington's water quality criteria for bacteria at the "end of pipe" from December – February. These criteria are a maximum geometric mean concentration of 100 colonies per 100 ml, with no more than 10 percent of the samples obtained for calculating the geometric mean value exceeding 200 colonies per 100 ml. Effluent data indicate the facility will not have difficulty complying with the more stringent fecal coliform effluent limits in effect from December through February, therefore EPA has not proposed a compliance schedule for the more-stringent effluent limits.

Appendix D: Reasonable Potential Calculations

The following describes the process EPA has used to determine if the discharge authorized in the draft permit has the reasonable potential to cause or contribute to a violation of Washington's federally approved water quality standards. EPA uses the process described in the *Technical Support Document for Water Quality-based Toxics Control* (EPA, 1991) to determine reasonable potential.

To determine if there is reasonable potential for the discharge to cause or contribute to an exceedance of water quality criteria for a given pollutant, EPA compares the maximum projected receiving water concentration to the criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a water quality-based effluent limit must be included in the permit. This section discusses how the maximum projected receiving water concentration is determined.

D. Mass Balance

For discharges to flowing water bodies, the maximum projected receiving water concentration is determined using the following mass balance equation:

$$C_dQ_d = C_eQ_e + C_uQ_u \quad \text{(Equation D-1)}$$

where,

C_d = Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
C_e = Maximum projected effluent concentration
C_u = Maximum measured receiving water upstream concentration (zero is assumed if no data are available)
Q_d = Receiving water flow rate downstream of the effluent discharge = $Q_e + Q_u$
Q_e = Effluent flow rate (set equal to the monthly average design flow of the WWTP)
Q_u = Receiving water low flow rate upstream of the discharge = 3 CFS during the irrigation season and 0 CFS during the non-irrigation season.

When the mass balance equation is solved for C_d, it becomes:

$$C_d = \frac{C_eQ_e + C_uQ_u}{Q_e + Q_u} \quad \text{(Equation D-2)}$$

The above form of the equation is based on the assumption that the discharge is rapidly and completely mixed with the receiving stream. If the mixing zone is based on less than complete mixing with the receiving water, the equation becomes:

$$C_d = \frac{C_eQ_e + C_u(Q_u \times MZ)}{Q_e + (Q_u \times MZ)} \quad \text{(Equation D-3)}$$

where MZ is the fraction of the receiving water flow available for dilution. Pursuant to WAC 173-201A-100(7)(a)(ii), the mixing zone is not to exceed 25% of the volume of the stream flow for chronic aquatic life and conventional water quality criteria. Pursuant to WAC 173-201A-

100(8)(a)(ii), the mixing zone is not to exceed 2.5% of the volume of the stream flow for acute aquatic life criteria. Therefore, MZ is equal to 25% (.25) for chronic and conventional criteria and 2.5% (0.025) for acute criteria.

During the non-irrigation season, the receiving water does not flow upstream of the discharge, therefore, there can be no dilution of the effluent in the receiving water and,

$$C_d = C_e \qquad \text{(Equation D-4)}$$

Equation D-3 can be simplified by introducing a "dilution factor,"

$$D_{chronic} = \frac{Q_e + 0.25Q_u}{Q_e} \qquad \text{(Equation D-5)}$$

$$D_{acute} = \frac{Q_e + 0.025Q_u}{Q_e} \qquad \text{(Equation D-6)}$$

During the irrigation season, there are two values for the dilution factor: one used to determine reasonable potential and wasteload allocations for acute aquatic life criteria, and used to determine reasonable potential and wasteload allocations for acute aquatic life criteria and for and conventional pollutants. The dilution factors are listed in Table D-1, below. During the non-irrigation season, there is no flow upstream of the discharge and therefore no mixing zone has been authorized.

Table D-1: Dilution Factors **March - November**	
Acute Dilution Factor	**Chronic Dilution Factor**
1.88	9.80

After the dilution factor simplification, Equation D-2 becomes:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{(Equation D-7)}$$

Equations D-4 (non-irrigation season) and D-7 (irrigation season) are the forms of the mass balance equation which were used to determine reasonable potential and calculate wasteload allocations. Note that Equations D-4 and D-7 are equivalent when the dilution factor "D" is equal to unity (1).

E. Maximum Projected Effluent Concentration

For chlorine, EPA has used the technology-based average weekly limit (750 µg/L) as the maximum projected effluent concentration. The technology-based effluent limit is used in this manner because water quality-based effluent limits are required only when a discharge of the pollutant at the technology-based limit has the reasonable potential to cause or contribute to water quality standards violations.

For fecal coliform, EPA has used the effluent limits in the previous permit as the maximum projected effluent concentrations. EPA evaluated the reasonable potential of the discharge to cause or contribute to both the geometric mean and maximum criteria for fecal coliform.

F. Maximum Projected Receiving Water Concentration

The discharge has reasonable potential to cause or contribute to an exceedance of water quality criteria if the maximum projected concentration of the pollutant at the edge of the mixing zone exceeds the most stringent criterion for that pollutant. The maximum projected receiving water concentration is calculated from Equation D-7:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{(Equation D-7)}$$

For chlorine, the maximum projected receiving water concentrations are, for the acute condition:

$$C_d = \frac{750 - 0}{1.88} + 0 = 399\ \mu g/L$$

And for the chronic condition:

$$C_d = \frac{750 - 0}{9.8} + 0 = 77\ \mu g/L$$

The acute and chronic water quality criteria for chlorine are 19 and 11 µg/L, respectively. The maximum projected receiving water concentrations for both the acute and chronic critical conditions are greater than the criteria. Therefore, the discharge has the reasonable potential to cause or contribute to water quality standards violations for chlorine, and a water quality-based effluent limit is required.

Tables D-2 through D-5, below, summarize the reasonable potential calculations for chlorine, fecal coliform, and temperature.

Table D-2: Reasonable Potential Calculations for Chlorine
March - November

Chronic Mixing Zone	25%
Acute Mixing Zone	2.5%
Qu (CFS)	3
Qe (CFS)	0.0853
Cu (mg/l)	0
Ce (mg/l)	0.75
Chronic Dilution Factor	9.80
Acute Dilution Factor	1.88
Max Chronic RWC (mg/l)	0.077
Max Acute RWC (mg/l)	0.399
Criteria	
Chronic WQ Criteria (mg/l)	0.011
Acute WQ Criteria (mg/l)	0.019
Reasonable Potential?	**YES**

Table D-3: Reasonable Potential Calculations for Chlorine **December - February**	
Chronic Mixing Zone	25%
Acute Mixing Zone	2.5%
Qu (CFS)	0
Qe (CFS)	0.0853
Cu (mg/l)	0
Ce (mg/l)	0.75
Chronic Dilution Factor	1.00
Acute Dilution Factor	1.00
Max Chronic RWC (mg/l)	0.750
Max Acute RWC (mg/l)	0.750
Criteria	
Chronic WQ Criteria (mg/l)	0.011
Acute WQ Criteria (mg/l)	0.019
Reasonable Potential?	**YES**

Table D-4: Reasonable Potential Calculations for Fecal Coliform **March - November**	
Mixing Zone	25%
Qu (CFS)	3
Qe (CFS)	0.0853
Cu (#/100 ml)	61
Ce, Geo Mean (#/100 ml)	200
Ce, Maximum (#/100 ml)	400
Dilution Factor	9.80
Geo Mean RWC (#/100 ml)	75
Max RWC (#/100 ml)	96
Criteria	
Geo Mean WQ Criteria (#/100ml)	100
Max WQ Criteria (#/100ml)	200
Reasonable Potential?	**NO**

Table D-5: Reasonable Potential Calculations for Fecal Coliform **December - February**	
Mixing Zone	25%
Qu (CFS)	0
Qe (CFS)	0.0853
Cu (#/100 ml)	61
Ce, Geo Mean (#/100 ml)	200
Ce, Maximum (#/100 ml)	400
Dilution Factor	1
Geo Mean RWC (#/100 ml)	200
Max RWC (#/100 ml)	400
Criteria	
Geo Mean WQ Criteria (#/100ml)	100
Max WQ Criteria (#/100ml)	200
Reasonable Potential?	**YES**

Reasonable Potential Calculations for Temperature **March – November**	
Mixing Zone	25%
Q_u (CFS)	3
Q_e (CFS)	0.08525
T_u (ºC)	14.8
T_e, Maximum (ºC)	25.6
Dilution Factor	9.80
Max RWT (ºC)	15.9
Increase (ºC)	1.1
Criteria	
WQ Criteria (ºC)	18
WQ Criteria, Increase (ºC)	1.3
Reasonable Potential?	**NO**

Reasonable Potential Calculations for Temperature **December – February**	
Mixing Zone	25%
Q_u (CFS)	0
Q_e (CFS)	0.08525
T_u (ºC)	0
T_e, Maximum (ºC)	10.0
Dilution Factor	1.00
Max RWT (ºC)	10.0
Criteria	
WQ Criteria (ºC)	18
Reasonable Potential?	**NO**

Appendix E: Effluent Limit Calculations for pH

The pH at the edge of the mixing zone is a function of effluent and ambient pH, temperature, and alkalinity. The critical alkalinity is the minimum for the ambient water and the maximum for the effluent. The critical pHs for the lower pH limit are the minimum effluent pH limit and the minimum ambient pH. The critical temperatures are the maximum ambient temperature and the 5^{th} percentile effluent temperature for the low pH critical conditions. Once the ambient pH, temperature and alkalinity and effluent temperature and alkalinity were input into the spreadsheet, EPA entered an effluent pH of 6.0 standard units (the lowest pH allowed by the technology-based effluent limits). The pH at the edge of the mixing zone was predicted to be 6.65 standard units, which is within the range of 6.5 to 8.5 standard units, as required by the water quality standards. Therefore, it is not necessary to include a water quality-based lower limit for pH.

EPA did not evaluate a high pH critical condition because the maximum receiving water pH was already above the upper bound of the water quality criteria (8.5 standard units), meaning that the receiving water cannot provide dilution of an effluent with a pH greater than 8.5 standard units. Therefore, the upper pH limit is 8.5 standard units at all times. From December through February, when there is no flow in Harrah Drain upstream of the discharge, the discharge must meet pH criteria (a range of 6.5 to 8.5 standard units) at the end-of-pipe.

Table E-1: Effluent Limit Calculations for pH	
INPUT	
1. DILUTION FACTOR AT MIXING ZONE BOUNDARY	9.800
2. UPSTREAM/BACKGROUND CHARACTERISTICS	
Temperature (deg C):	14.80
pH:	7.40
Alkalinity (mg CaCO3/L):	72.00
3. EFFLUENT CHARACTERISTICS	
Temperature (deg C):	5.00
pH:	**6.00**
Alkalinity (mg CaCO3/L):	120.00
OUTPUT	
1. IONIZATION CONSTANTS	
Upstream/Background pKa:	6.42
Effluent pKa:	6.51
2. IONIZATION FRACTIONS	
Upstream/Background Ionization Fraction:	0.90
Effluent Ionization Fraction:	0.23
3. TOTAL INORGANIC CARBON	
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	79.57
Effluent Total Inorganic Carbon (mg CaCO3/L):	511.91
4. CONDITIONS AT MIXING ZONE BOUNDARY	
Temperature (deg C):	13.8
Alkalinity (mg CaCO3/L):	76.90
Total Inorganic Carbon (mg CaCO3/L):	123.68
pKa:	6.43
pH at Mixing Zone Boundary:	**6.65**

Appendix F: WQBEL Calculations - Aquatic Life Criteria

The following calculations demonstrate how the water quality-based effluent limits (WQBELs) in the draft permit were calculated. The WQBELs for chlorine are intended to protect aquatic life criteria. The following discussion presents the procedure used to calculate the water quality-based effluent limits for chlorine. The calculations are summarized in Table F-1.

A. Calculate the Wasteload Allocations (WLAs)

There are two seasons under consideration for calculating a water quality-based effluent limit for chlorine: the irrigation season (March though November) and the non-irrigation season (December through February). Because there is flow in the Harrah Drain upstream of the discharge during the irrigation season, a mixing zone for chlorine could be granted during this season. However, EPA has determined that, while the wasteload allocations during the irrigation season would be less stringent than during the non-irrigation season, the effluent limits would regardless be less than 100 µg/L, which is the "minimum level" (ML) for EPA-approved methods for measuring chlorine in effluents, at all times. In cases where the calculated effluent limits are less than the minimum level, EPA uses the minimum level as the "compliance evaluation level," meaning that the discharge will be in compliance with the effluent limits as long as the concentration of the limited pollutant is less than the minimum level. Therefore, performing chlorine effluent limits on a seasonal basis would effect no practical change to the permit.

Wasteload allocations (WLAs) are calculated using the same mass balance equations used to calculate the concentration of the pollutant at the edge of the mixing zone in the reasonable potential analysis (Equation D-4). To calculate the wasteload allocations, C_d is set equal to the acute or chronic criterion and the equation is solved for C_e. The calculated C_e is the acute or chronic WLA. Equation D-4 is rearranged to solve for the WLA, becoming:

$C_e = WLA = C_d$ (Equation F-1)

In the case of chlorine, for the acute criterion,

WLA_a = 19 µg/L

For the chronic criterion,

WLA_c = 11 µg/L

The next step is to compute the "long term average" concentrations which will be protective of the WLAs. This is done using the following equations from EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD):

$LTA_a = WLA_a \times \exp(0.5\sigma^2 - z\sigma)$ (Equation F-3)
$LTA_c = WLA_c \times \exp(0.5\sigma_4^2 - z\sigma_4)$ (Equation F-4)

where,

$\sigma^2 = \ln(CV^2 + 1)$
$\sigma = \sqrt{\sigma^2}$

$\sigma_4^2 = \ln(CV^2/4 + 1)$
$\sigma = \sqrt{\sigma_4^{\,2}}$
$z = 2.326$ for 99th percentile probability basis

In the case of chlorine,

$CV = 0.603$
$\sigma^2 = \ln(0.603^2 + 1) = 0.310$
$\sigma = \sqrt{\sigma^2} = 0.557$
$\sigma_4^2 = \ln(0.603^2/4 + 1) = 0.087$
$\sigma = \sqrt{\sigma_4^{\,2}} = 0.295$
$z = 2.326$ for 99th percentile probability basis

Therefore,

$LTA_a = 19\ \mu g/L \times \exp(0.5 \times 0.308 - 2.326 \times 0.557)$
$\mathbf{LTA_a = 6.1\ \mu g/L}$

$LTA_c = 11\ \mu g/L \times \exp(0.5 \times 0.087 - 2.326 \times 0.295)$
$\mathbf{LTA_c = 5.8\ \mu g/L}$

The LTAs are compared and the more stringent is used to develop the daily maximum and monthly average permit limits as shown below. For chlorine, from March through November, the chronic LTA of 5.8 µg/L is more stringent.

B. Derive the maximum daily and average monthly effluent limits

Using the TSD equations, the MDL and AML effluent limits are calculated as follows:

$MDL = LTA \times \exp(z_m\sigma - 0.5\sigma^2)$ (Equation F-5)
$AML = LTA \times \exp(z_a\sigma_n - 0.5\sigma_n^2)$ (Equation F-6)

where σ, and σ^2 are defined as they are for the LTA equations (F-2 and F-3) and,

$\sigma_n^2 = \ln(CV^2/n + 1)$
$\sigma = \sqrt{\sigma_n^{\,2}}$
$z_a = 1.645$ for 95th percentile probability basis
$z_m = 2.326$ for 99th percentile probability basis
n = number of sampling events required per month = 8

In the case of chlorine,

$MDL = 5.8\ \mu g/L \times \exp(2.326 \times 0.557 - 0.5 \times 0.310)$
MDL = 18 µg/L

$AML = 5.8\ \mu g/L \times \exp(1.645 \times 0.211 - 0.5 \times 0.044)$
AML = 8 µg/L

Table F-1, below, details the calculations for water quality-based effluent limits based on two-value aquatic life criteria.

Table F-1: Chlorine Effluent Limit Calculation Summary	
WLAs	
WLAa	0.019
WLAc	0.011
LTA Calculations	
LTA Confidence Level	0.99
Z-Score of LTA Confidence Level	2.326
CV	0.603
CV^2	0.363
σ_4^2	0.087
σ_4	0.295
σ^2	0.310
σ	0.557
LTAc (mg/l)	0.0058
LTAa (mg/l)	0.0061
Limiting LTA	**0.0058**
Effluent Limit Calculations	
n	8
σ_n^2	0.044
σ_n	0.211
MDL Confidence Level	0.99
AML Confidence Level	0.95
Z-Score of MDL Confidence Level	2.326
Z-Score of AML Confidence Level	1.645
Daily and Monthly Limits	
MDL (mg/l)	**0.018**
AML (mg/l)	**0.008**

Appendix G: Endangered Species Act

As discussed in Section VIII.A. of this Fact Sheet, Section 7 of the Endangered Species Act requires federal agencies to consult with NOAA Fisheries and the U.S. Fish and Wildlife (USFWS) regarding potential affects a federal action may have on threatened and endangered species.

A. Threatened and Endangered Species

According to the USFWS website (http://www.fws.gov/easternwashington/county%20species%20lists.htm), the following threatened and endangered species occur in Yakima County:

Endangered Species:

- Gray wolf

Threatened species:

- Bald eagle
- Bull Trout
- Canada Lynx
- Grizzly Bear
- Marbled murrelet
- Northern spotted owl
- *Spiranthes diluvialis* (Ute ladies'-tresses), plant

According to the NOAA Fisheries Website (http://www.nwr.noaa.gov/Species-Lists.cfm), the threatened Middle Columbia River Steelhead may occur in the vicinity of the discharge.

B. Potential Effects for Species

Bald eagle (Haliaeetus leucocephalus) - Threatened

Bald eagles begin to appear at wintering sites in early November and concentrate at locations with open water during the colder months when smaller or slower moving waterbodies freeze. Diet includes fish species, mule deer, ground squirrels, rabbits, waterfowl, and other small mammals. Consumption of fish relative to other species declines in the colder months as water bodies freeze. Water quality could potentially affect bald eagles through four avenues: prey displacement or quantitative decline, prey mortality, bioaccumulation in prey, or direct consumption. One of the general recommendations for augmenting bald eagle populations is to reduce mortality through exposure to contaminants.

The bald eagle historically ranged throughout North America except for extreme northern Alaska and Canada and central and southern Mexico. A significant population of bald eagles winters in Washington and some are presumed to remain in the state year round.

As discussed above, the primary threats to bald eagles are prey displacement or mortality, bioaccumulation of contaminants through prey species, or direct exposure to contaminants. Reissuance of the NPDES permit for the Town of Harrah for their domestic wastewater treatment plant discharge will not affect prey availability/distribution. Additionally, it will not result in a potential increase of toxic compounds in prey species or an increase in the potential for direct exposure to toxics. The facility discharges treated domestic waste. The proposed permit requires monitoring for potentially harmful contaminants, hence, it is not expected that reissuance of the wastewater discharge permit to the Town of Harrah Wastewater Treatment Plant (WWTP) would affect bald eagle.

Steelhead (Oncorhynchus mykiss) - Threatened

Steelhead have the most complex life histories of any Pacific salmon species. These fish have variable run timing and degree of anadromy and are capable of more than one spawning cycle. Inland steelhead of the Middle Columbia River Basin, steelhead are ‘stream-maturing’ as they enter freshwater in a sexually immature state and require several months in freshwater before they mature then spawn. These stream maturing fish are referred to as ‘summer run’ based on the time that they enter freshwater. Summer steelhead of the Columbia River subbasin have generally one potential run timing, which is the A-run. The A-run enters freshwater from June to August. A-run fish have generally spent one year in the ocean.

Steelhead can have various life histories in terms of the degree of anadromy. The anadromous form that migrates between the ocean and freshwater are termed ‘steelhead’, while the non-anadromous or ‘resident’ form does not migrate and is called ‘rainbow trout’. Like steelhead, rainbow trout spawn in winter/spring and emerge in spring/early summer. In inland O. mykiss populations, including the Middle Columbia River basin, both anadromous and non-anadromous forms commonly co-occur. Nonanadromous O. mykiss of the inland type are often called Columbia River redband trout. Although both the anadromous and non-anadromous forms are classified as the same species taxonomically, the relationship of the two forms in a given area is typically unclear. The migratory and resident forms of this species may be ecophenotypes within a common gene pool or they may be distinct due to reproductive isolation.

The primary factors that have affected Steelhead populations are dam construction (which restricts the ability of individuals to reach their spawning areas); and habitat loss and degradation due to human activities such as land development, logging, mining, and agriculture.

The Steelhead salmon has been listed as threatened in the Middle Columbia River basin. However, reissuance of the wastewater discharge permit to the Town of Harrah WWTP will not affect Steelhead. As discussed above, the primary threats to Steelhead are dams and habitat degradation. Reissuance of the NPDES permit to the Town of Harrah WWTP will not lead to increased dam construction or habitat degradation. Therefore, reissuance of this permit will not affect Steelhead.

Bull Trout (Salvelinus confluentus) - Threatened

The bull trout is a member of the char subgroup of the family Salmonidae. Bull trout population are known to exhibit two distinct life history forms: 1) resident bull trout that spend their entire life cycle in the same (or near) streams in which they were hatched, and 2) migratory bull trout which can exhibit either a fluvial life history - spawning in tributary streams where the young rear from one to four years before migrating to a river, or an adfluvial form - spawning in tributary streams where the young rear before migrating to a lake.

Bull trout generally mature at between 5 and 7 years of age. Spawning occurs from August through November. Embryos incubate over winter and hatch in late winter or early spring. Emergence has been observed over a relatively short period of time after a peak in stream discharge from early April through May.

In-stream habitat requirements make bull trout exceptionally sensitive to activities which directly or indirectly affect stream channel integrity and natural flow patterns, including groundwater flow. Stream flow, bed load movement, and channel instability influence the survival of juvenile bull trout. The presence of fine sediments reduces pool depth, alters substrate composition, reduces interstitial spaces in substrate, and causes channel braiding, all of which can negatively impact the survival of bull trout eggs and fry. Cover, such as large woody debris, undercut banks, boulders, pools, side margins, and beaver ponds, is heavily utilized by all life stages of bull trout for rearing, foraging and resting habitat, as well as for protection from predators. Bull trout prefer cold water, and temperatures in excess of 15°C are considered to limit their distribution. USACE suggested that water temperature in fact influences bull trout distribution more than any other habitat factor. Finally, migration corridors are important for sustaining bull trout populations, allowing for gene flow and connecting wintering areas to summer/foraging habitat.

The bull trout is threatened by habitat degradation (e.g. land management activities with negative impacts on water quality or spawning habitat); passage restrictions, mortality, or entrapment at dams; and competition from non-native lake and brook trout. According to USACE, bull trout populations are likely affected by dam operation, as well as, augmentation (i.e., spill) used to mitigate effects on salmon migration by increasing fish passage efficiency. Bull trout growth, survival and long-term population persistence are correlated with stream habitat conditions such as cover, channel stability, substrate composition, temperature, and migratory corridors. These habitat features are often impaired as the result of land management activities such as forest harvest, road building, hydropower development, irrigation diversions, and grazing. Mining has altered stream channel morphology, increased sediment transport and deposition, decreased vegetative cover, and contributed to acidic water discharge and heavy metal water pollution.

Reissuance of NPDES permit to the Town of Harrah WWTP will not affect bull trout. As discussed above, the primary threats to bull trout are changes in water temperature and habitat degradation. Reissuance of the Town of Harrah NPDES permit will not lead to increased habitat degradation. The discharge does not have the reasonable potential cause or contribute to water quality standards violations for temperature. Therefore, reissuance of the permit will not affect bull trout.

Ute ladies' - tresses (Spiranthes diluvialis) - Threatened

Ute ladies' tresses is endemic to moist soils in mesic or wet meadows near springs, lakes, and perennial streams. The elevation range of known occurrences is 4,000 to 7,000 feet. Generally, this species occurs in areas where the vegetation is relatively open (e.g. grass and forb dominated sites), but some populations are found in riparian woodlands. This orchid is found in several areas of the interior western United States. This species has only recently been recorded on a few sites in central Washington, where it can occur at relatively low elevations (down to roughly 700 feet in Chelan County).

Urban development and watershed alterations in riparian and wetland habitat adversely affect this plant. It may also be threatened by invasions of exotic plants species such as purple loosestrife, whitetop and reed canary grass.

Reissuance of the NPDES permit to the Town of Harrah WWTP will not cause an increase in any of the identified threats to the Ute ladies' - tresses. Therefore, reissuance of this permit will not have an affect on this species.

Marbled murrelet – Threatened

The main threats to the marbled murrelet include harvest of old-growth and mature coastal coniferous forests, offshore oil spills and marine pollutants, incidental mortality associated with gill net fisheries and marine aquaculture activities, and nest predation. The reissuance of an NPDES permit to the Town of Harrah WWTP will have no effect on any of these threats. Therefore, the reissuance of this permit will have no effect on this species.

Canada Lynx – Threatened

The main threats to the Canada lynx include habitat destruction through logging, habitat fragmentation due to road construction, forestry, and agriculture, historical excessive trapping, winter recreation (e.g. snowmobiling and ski area development), incidental harvest, and competition and displacement by bobcat and coyote. The reissuance of an NPDES permit to the Town of Harrah WWTP will have no effect on any of these threats. Therefore, the reissuance of this permit will have no effect on this species.

Grizzly Bear – Threatened

Threats to the grizzly bear in this recovery zone include incomplete habitat protection measures (motorized access management), small population size, and population fragmentation resulting in genetic isolation. The reissuance of an NPDES permit to the Town of Harrah WWTP will have no effect on any of these threats. Therefore, the reissuance of this permit will have no effect on this species.

Northern spotted owl – Threatened

The major threat to the northern spotted owl is habitat destruction by logging and/or forest fragmentation, and competition and displacement by the barred owl. The reissuance of an NPDES permit to the Town of Harrah WWTP will have no effect on any of these threats. Therefore, the reissuance of this permit will have no effect on this species.

Gray Wolf – Endangered

The threats to the gray wolf include direct human-caused mortality and habitat loss. The reissuance of an NPDES permit to the Town of Harrah WWTP will have no effect on any of these threats. Therefore, the reissuance of this permit will have no effect on this species.